APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/923,911	08/07/2001	Benjamin L. Lee	TI-31446	5526

			EXAMINER
23494	7590	02/15/2005	AMARI, ALESSANDRO V

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ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 02/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/923,911	LEE ET AL.
	Examiner	Art Unit	
	Alessandro V. Amari	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>08 December 2004</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-36</u> is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) <u>14-26</u> is/are allowed.

6)☒ Claim(s) <u>1,3-13 and 27</u> is/are rejected.

7)☒ Claim(s) <u>2 and 28-36</u> is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All   b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2.   Claims 1 and 3-8 are rejected under 35 U.S.C. 102(b) as being anticipated by

Bloom et al US 5,311,360.

In regard to claim 1, Bloom et al teaches (see Figures 7, 8) a method for

operating a micromechanical grating, said method comprising providing a

micromechanical grating having a two dimensional array of deflectable elements (48),

each element operable to tilt about an axis to a tilt angle and spaced apart from

adjacent elements by a grating pitch ($\underline{d}$); selecting a wavelength of near monochromatic

spatially coherent light, determining a grating pitch, an angle of incidence, a tilt angle

and a diffraction order to satisfy:

$$\theta_t\,(\theta_i,\,n) = \tfrac{1}{2}\,\{\arcsin\,[n\lambda/d)\mathrm{SQRT}\ 2 - \sin(\theta_i)] + \theta_i\}$$

as described in column 3, lines 10-53 and column 7, lines 13-43 and as shown in

Figures 7 and 8. Although the prior art does not specifically teach the claimed equation,

this feature is seen to be an inherent teaching of this device since the device is a grating

which is characterized by the grating equation. The claimed equation is a derivation of

the grating equation.

Regarding claim 3, Bloom et al teaches selecting an angle of incidence, and a

diffraction order comprising determining a grating pitch and a tilt angle for a micromirror

device as shown in Figures 7 and 8 and as described in column 7, lines 13-43.

Regarding claim 4, Bloom et al teaches illuminating said micromechanical grating

with near monotonic spatially coherent light at said angle of incidence; and collecting

said near monotonic spatially coherent light from said nth diffraction order as described

in column 3, lines 10-53 and column 7, lines 13-43.

Regarding claim 5, Bloom et al teaches that said illuminating performed such that

said illumination light and said collected light traverse a common path as shown in

Figures 3, 4, 7 and 8 and as described in column 3, lines 10-53 and column 7, lines 13-

43.

Regarding claim 6, Bloom et al teaches said illuminating performed such that

said illumination light and said collected light traverse a common path, said common

path normal to a tilted said deflectable element of said micromechanical grating as

shown in Figures, 3, 4, 7 and 8 and as described in column 7, lines 13-43.

In regard to claim 7, Bloom et al teaches (see Figures 7, 8) a micromirror device

comprising a two-dimensional array of deflectable mirrors (48), said array having a pitch

distance between adjacent mirrors as shown in Figures 7 and 8, a support (50)

corresponding to each deflectable mirror such that each deflectable mirror can deflect to

a tilt angle; and wherein said micromirror device is blazed for near monochromatic

spatially coherent light having a wavelength in the range of 1480-1580 nm as described

in column 7, lines 13-43. Although the prior art does not specifically teach the light in

the range recited, this is seen to be an inherent teaching of this device since this device

is used in the optical communication field and the ranges cited operate in that field.

Regarding claim 8, Bloom et al teaches that said micromirror device is blazed in

the Littrow condition for near monochromatic spatially coherent light having a

wavelength in the range of 1480-1580 nm as described in column 7, lines 13-43.

Although the prior art does not specifically teach that the device is blazed in the Littrow

condition, this is seen to be an inherent teaching of this device since there is some

condition, wherein the micromirror device meets the Littrow condition.

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

4.   Claims 9-13 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Kessler et al US 6,434,291 in view of Bloom et al US 5,311,360.

In regard to claims 9 and 27, Kessler et al teaches (see Figures 1-6) a system,

comprising an optical grating (130), one or more near monochromatic spatially coherent

light input signals coupled to said optical grating, said optical grating converting said

light into collimated channels of varying frequency, said collimated light being passed

through condensing optics (140) onto the surface of a micromirror device (150) as

described in column 5, lines 29-34.

Regarding claims 9, 10-13, Kessler teaches that the system can add or remove, selectively switch or modulate or attenuate frequency channels from said light as described in column 2, lines 1-14.

However, in regard to claims 9 and 27, Kessler does not teach a two-dimensional array of deflectable mirrors, said array having a pitch distance between adjacent mirrors, a deflectable member supporting each said mirror, said deflectable member establishing a tilt angle for each its corresponding mirror; and wherein said micromirror device is blazed for near monochromatic spatially coherent light having a wavelength in the range of 1480-1580 nm or wherein the DMD is fabricated with pixel pitch and tilt angle optimized to meet blazed operational conditions.

In regard to claims 9 and 27, Bloom et al does teach a two-dimensional array of deflectable mirrors (48), said array having a pitch distance between adjacent mirrors as shown in Figures 7 and 8, a support (50) corresponding to each deflectable mirror such tat each deflectable mirror can deflect to a tilt angle; and wherein said micromirror device is blazed for near monochromatic spatially coherent light having a wavelength in the range of 1480-1580 nm and wherein the micromirror device is fabricated with pixel pitch and tilt angle optimized to meet blazed operational conditions as described in column 7, lines 13-43. Although the prior art does not specifically teach the light in the range recited, this is seen to be an inherent teaching of this device since this device is used in the optical communication field and the ranges cited operate in that field.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the mirrors of Bloom et al in the device of Kessler et al in

order to provide for high resolution, high modulation depth, optical flatness, VLSI compatible, easy handling compatibility and low cost as described in column 3, lines 10-17 of Bloom et al.

Allowable Subject Matter

5.   Claims 14-26 are allowed.

6.   Claims 2 and 28-36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7.   Claim 2 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "a center of a Fraunhofer envelope is aligned with said nth diffraction order" as set forth in the claimed combination.

Claim 14 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "$\sin(\theta n) = \sin(\theta f)$ where θf is the angle for the Fraunhofer envelope, to align the center of the Fraunhofer envelope center with diffraction order n" as set forth in the claimed combination. Claims 15-20 are also allowable based upon their dependence on claim 14.

Claim 21 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "$\sin(\theta n) = \sin(\theta f)$ where θf is the angle for the Fraunhofer envelope to be aligned with one of the n diffraction orders" as set forth in the claimed combination. Claims 22-26 are also allowable based upon their dependence on claim 21.

Claim 28 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "$\sin(\theta n) = \sin(\theta f)$ where θf is the angle for the Fraunhofer envelope, to align the center of the Fraunhofer envelope center with diffraction order n" as set forth in the claimed combination. Claims 29-36 are also allowable based upon their dependence on claim 28.

The prior art, Bloom et al and Kessler et al teach a system for optical telecommunications comprising an optical grating, wherein the device satisfies the claimed equation. However, the prior art does not teach that a center of a Fraunhofer envelope is aligned with said nth diffraction order and there is no motivation or teaching to modify this difference as derived.

Response to Arguments

8.   Applicant's arguments filed 8 December 2004 have been fully considered but they are not persuasive.

The applicant argues that Bloom does not show a micromechanical grating having a two dimensional array of deflectable elements, each element operable to tilt about an axis to a tilt angle and spaced apart from adjacent elements by a grating pitch.

In response to this argument, the applicant's attention is directed to Figures 7 and 8 of Bloom (reproduced below) which clearly show deflectable elements (48) arranged in a two dimensions (i.e., an array). Furthermore, each element is operable to tilt about an axis (54) to a tilt angle and spaced apart from adjacent element by a grating pitch ($\underline{d}$) as shown by the Figures below. Applicant's attention is further directed to Bloom et al, column 7, lines 30-35, which state:

"As each resultant force F, is off-set from the axis of rotation 54 (which coincides with the centerline of each neck 50), a moment of rotation or torque is applied to each element 48 which results in a rotation of each element 48 about its axis 54 to a position 48' indicated in broken lines."

Fig. 6

Fig. 7

Fig. 8
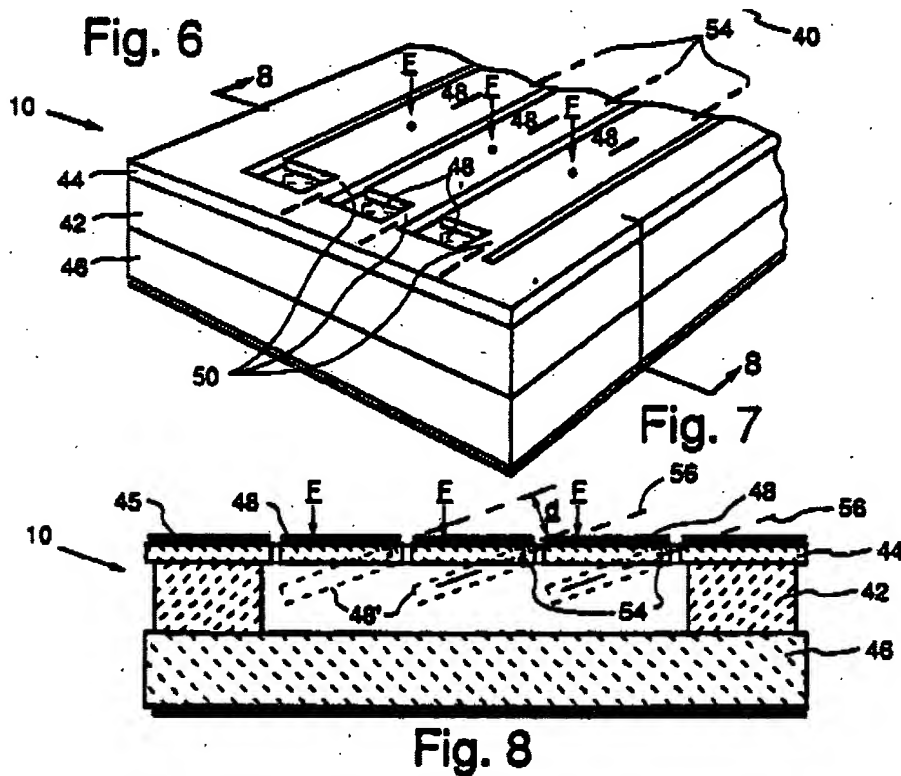
Therefore, the examiner maintains that Bloom et al does show the elements claimed.

The applicant further argues that Bloom does not show a two dimensional array of deflectable mirrors, having a pitch distance d between adjacent mirrors but that Bloom teaches a linear array of tilting elements.

In response to this argument, the examiner would like to point out that the rejection is based upon the claim recitation. The examiner maintains that Figures 7 and

8 do show deflectable mirrors (48) arranged in a two dimensions (i.e., an array) and

having a pitch distance d between adjacent mirrors as shown by $\underline{d}$ in the upper portion

of Figure 8.

The applicant further argues in regard to claims 9 and 27, that Bloom teaches a

linear array of tilting elements rather than a two-dimensional array of claims 9 and 27.

In response to this argument, the Examiner would again point out that that

Figures 7 and 8 of Bloom et al do show deflectable mirrors or elements (48) arranged in

a two dimensions (i.e., an array) and as argued above and thus meet the claim

limitations.

Conclusion

9.   Applicant's amendment necessitated the new ground(s) of rejection presented in

this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37

CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the date of this final action.

10.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alessandro V. Amari whose telephone number is (571) 272-2306. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on (571) 272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ava ꝗꝵ
4 February 2005

MARK A. ROBINSON
PRIMARY EXAMINER